

Attorney Docket No. 0670-0257

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

Kenichi SHIRAISHI et al.

Serial No. 09/805,766

Filed: March 16, 2001

For: RADIO DIGITAL SIGNAL RECEIVER

) Group Art Unit: 2631

) Examiner: K. Burd

) CERTIFICATE OF MAILING

) I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on

11-4-04

Ashe M. Stampu

response

RESPONSE

Honorable Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

The Official Action mailed August 12, 2004, has been received and its contents carefully noted. This response is filed within three months of the mailing date of the Official Action and therefore is believed to be timely without extension of time. Accordingly, the Applicants respectfully submit that this response is being timely filed.

The Applicants have not received acknowledgment of the Information Disclosure Statement filed on March 16, 2001. The Applicants respectfully request that the Examiner provide an initialed copy of the Form PTO-1449 evidencing consideration of the Information Disclosure Statement filed March 16, 2001.

Claims 2-11 are pending in the present application, of which claims 2, 6 and 11 are independent. For the reasons set forth in detail below, all claims are believed to be in condition for allowance. Favorable reconsideration is requested.

Paragraph 1 of the Official Action rejects claims 6, 8 and 11 as anticipated by U.S. Patent No. 5,909,384 to Tal et al. The Applicants respectfully traverse the rejection because the Official Action has not established an anticipation rejection.

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As stated in MPEP § 2131, to establish an anticipation rejection, each and every element as set forth in the claim must be described either expressly or inherently in a single prior art reference. Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

The Applicants respectfully submit that an anticipation rejection cannot be maintained against the independent claims of the present application. The Official Action asserts that Tal discloses a radio digital signal receiver in which the "C/N (SNR) of the received signal is measured ... the corresponding BER [bit error rate] is determined from this value" and the "taps for the equalizing filter are changed according to these values" (page 2, Paper No. 6). Presumably, the Official Action is asserting that Tal discloses that a C/N (SNR) of a received signal is measured, the corresponding BER is determined from the C/N and the taps for the equalizing filter are changed according to the BER and C/N. The Applicants respectfully disagree and traverse the above assertions in the Official Action.

Independent claims 2, 6 and 11 clearly recite three primary technical features:

- (i) detecting a C/N of a received modulation signal;
- (ii) detecting a bit error rate (BER) of a decoded digital signal; and
- (iii) changing the characteristic of a carrier regeneration loop on the basis of estimated phase noise characteristics (claim 2), on the basis of a determined result of a magnitude of a decoding error rate (claim 6), or on the basis of a compared result (claim 11).

In other words, the present invention is directed to independently detecting the reception C/N and the BER of the decoded digital signal and estimating phase-noise characteristics of an outdoor unit (i.e., an antenna plus a down converter) on the basis of the BER when the reception C/N has a specific value.

The technical idea of the present invention is based on the discovery of the phenomenon that the relationship between the reception C/N and the BER of the digital signal (when burst waves are received) varies depending on the phase noise

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characteristic of the outdoor unit. The present invention properly estimates the phase-noise characteristic of the outdoor unit on the basis of (i) the known relationship (which has been measured beforehand) among the reception C/N, the BER and the phase-noise level, and (ii) the C/N and the BER which are actively observed when operating the receiver.

According to the present invention, even if it is difficult to directly measure the phase-noise characteristic of the outdoor unit, the phase-noise characteristic of the outdoor unit can be accurately estimated on the basis of the detection of both the C/N and the BER upon reception. Therefore, the present inventors have found a specific technical advantage in that it is possible to automatically establish the carrier regenerative loop characteristic suitable to the property of the outdoor unit connected to the receiver.

The above-referenced features of the present invention are concisely defined in independent claim 2, and the Applicants herein explain the details with reference to the specification and drawings. For example, the feature that the reception C/N (CNR) and the BER are detected independently of each other is explained in the specification at page 10, lines 3-13, as follows:

The CNR measurement circuit 5 measures a CNR based on the distribution of vector by the inputted base band signals Id, Qd and sends the CNR data based on the CNR to the control circuit 8. The phase error detection circuit 6 is practically a look-up table and sends a phase error data, which is a phase different between a receiving point comprising the inputted base band signals Id, Qd and a point where the received signals are to be converged, to the control circuit 8 and the loop filter 9. The trellis 7 trellis-decodes the 8PSK-modulating signal and sends a bit error rate data (BER) of the transmission path in the 8PSK-modulating section to the control circuit 8.

In addition, Figure 3 shows that the BER varies depending on the phase-noise level when the C/N assumes 15dB, and Figure 5 shows the situation that the C/N varies depending on the phase-noise level when the BER is 2×10^{-4} .

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As noted in detail below, Tal does not teach detecting a C/N of a received modulation signal; detecting a BER of a decoded digital signal; and changing the characteristic of a carrier regeneration loop on the basis of estimated phase noise characteristics, on the basis of a determined result of a magnitude of a decoding error rate, or on the basis of a compared result, either explicitly or inherently.

Tal only discloses a digital filter which operates to measure a signal-to-noise ratio (SNR) and to dynamically change the characteristic of an adaptive filter having a plurality of taps (i.e., such that specific taps are removed or added). Tal does not teach, either explicitly or inherently, that the BER and the C/N are detected independently of each other as in the present invention.

Also, the Official Action appears to rely on column 2, line 62, to column 3, line 7, of Tal to teach that "the corresponding BER is determined from this value" (page 2, Paper No. 6), where "this value" is presumed to mean the C/N (SNR). However, the above-referenced disclosure in Tal only refers to the generalization that the "BER is in turn directly related to the signal-to-noise ratio (SNR) at the output of the slicer in the receiver. Thus, there exists a maximum allowable BER which translates to a minimum allowable SNR" (column 2, line 84, to column 3, line 1). Thus, Tal does not teach that the BER and the C/N are detected independently of each other.

Further, Tal does not teach controlling the characteristic of the carrier regeneration loop contained in the receiver, as recited in the independent claims of the present invention. This is evident from the fact that the operation of the demodulator 80 of Tal, which includes a local oscillator relating to the carrier regenerative loop, is fixed (as shown in Figure 3 of Tal).

Therefore, Tal does not teach detecting a C/N of a received modulation signal; detecting a BER of a decoded digital signal; and changing the characteristic of a carrier regeneration loop on the basis of estimated phase noise characteristics, on the basis of a determined result of a magnitude of a decoding error rate, or on the basis of a compared result, either explicitly or inherently.

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Since Tal does not teach all the elements of the independent claims, either explicitly or inherently, an anticipation rejection cannot be maintained. Accordingly, reconsideration and withdrawal of the rejections under 35 U.S.C. § 102 are in order and respectfully requested.

Paragraph 2 of the Official Action rejects claims 2-5, 7, 9 and 10 as obvious based on the combination of Tal and U.S. Patent No. 5,027,371 to Sehier et al. The Applicants respectfully traverse the rejection because the Official Action has not made a *prima facie* case of obviousness.

As stated in MPEP §§ 2142-2143.01, to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. "The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." In re Kotzab, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

Sehier does not cure the deficiencies in Tal. The Official Action relies on Sehier to allegedly teach phase shift keying (PSK) (page 3, Paper No. 6). However, Tal and Sehier, either alone or in combination, do not teach or suggest detecting a C/N of a received modulation signal; detecting a BER of a decoded digital signal; and changing

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the characteristic of a carrier regeneration loop on the basis of estimated phase noise characteristics, on the basis of a determined result of a magnitude of a decoding error rate, or on the basis of a compared result. Since Tal and Sehler do not teach or suggest all the claim limitations, a *prima facie* case of obviousness cannot be maintained.

Also, Tal chiefly aims to operate an adaptive filter provided in the receiver used in a communication system. Tal does not recognize the problem in the prior art that an appropriate characteristic of a carrier regenerative loop cannot be determined in a situation where a phase-noise characteristic of an outdoor unit is unknown. Therefore, it is unclear how or why one of ordinary skill in the art would have looked to Tal in order to achieve a device for detecting a C/N of a received modulation signal; detecting a BER of a decoded digital signal; and changing the characteristic of a carrier regeneration loop on the basis of estimated phase noise characteristics, on the basis of a determined result of a magnitude of a decoding error rate, or on the basis of a compared result.

In the present application, it is respectfully submitted that the prior art of record, alone or in combination, does not expressly or impliedly suggest the claimed invention and the Official Action has not presented a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references.


For the reasons stated above, the Official Action has not formed a proper *prima facie* case of obviousness. Accordingly, reconsideration and withdrawal of the rejections under 35 U.S.C. § 103(a) are in order and respectfully requested.

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Should the Examiner believe that anything further would be desirable to place this application in better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,


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